Listing of Claims:

1-36. (canceled without prejudice)

37. (new) A projection objective with an object plane and an image plane and a light path for a bundle of light rays from the object plane to the image plane, the projection objective comprising:

at least six mirrors, each mirror having a physical mirror surface and a vertex at the physical mirror surface, wherein the physical distance between the vertexes of the physical mirror surfaces of adjacent mirrors is chosen such that the at least six mirrors each have sufficient mirror thickness and stability to prevent surface deformations due to high layer tensions.

38. (new) The projection objective of claim 37, wherein the mirror thicknesses of the at least six mirrors are sufficient to prevent surface deformations when the layer tensions on the at least six mirrors are lower than 350 MPa.

39. (new) The projection objective of claim 37, wherein the mirror thicknesses of the at least six mirrors are sufficient to prevent surface deformations in edge regions of the at least six mirrors.

40. (new) The projection objective of claim 37, wherein the physical mirror surfaces comprise a multilayer system of Mo/Be or a Mo/Si layer pairs.

41. (new) The projection objective of claim 40, wherein the multilayer system comprises approximately 70 layer pairs.

42. (new) A projection objective with an object plane and an image plane and a light path for a bundle of light rays from the object plane to the image plane, the projection objective comprising:

at least six mirrors, a first mirror (S1), a second mirror (S2), a third mirror (S3), a fourth mirror (S4), a fifth mirror (S5) and a sixth mirror (S6) in the light path from the object plane to the image plane, wherein each of the at least six mirrors has a physical mirror surface and wherein the physical distance between a vertex of the third mirror (S3) and a

vertex of the sixth mirror (S6) is chosen such that the at least six mirrors have sufficient thickness and stability properties to prevent surface deformations due to high layer tensions.

43. (new) The projection exposure objective of claim 42, wherein the physical distance between the vertex of the third mirror and the vertex of the sixth mirror (S3S6) satisfies the following relationship:

0.3 x (a used diameter of the third mirror S3 + a used diameter of the sixth mirror S6) < S3S6.

44. (new) The projection objective of claim 42, wherein the physical mirror surfaces have a rotational symmetry with respect to a principal axis (PA).

45. (new) The projection objective of claim 42, further comprising an aperture stop (B) in the light path positioned between the second mirror (S2) and the third mirror (S3).

46. (new) The projection objective of claim 45, wherein a ratio of a physical distance between a vertex of the physical mirror surface of the first mirror and the vertex of the physical mirror surface of the third mirror (S1S3) to a physical distance between the vertex of the physical mirror surface of the first mirror and a vertex of the physical mirror surface of the second mirror (S1S2) is within the range of:

$0.5 < S1S3/S1S2 < 2$.

47. (new) The projection objective of claim 42, further comprising an aperture stop (B) positioned on or near the second mirror (S2).

48. (new) The projection objective according to claim 47, wherein a ratio of a physical distance between the vertex of the physical mirror surface of the second mirror and the vertex of the physical mirror surface of the third mirror (S2S3) to a physical distance between the vertex of the physical mirror surface of the third mirror and a vertex of the physical mirror surface of the fourth mirror (S3S4) is within in the range:

$0.7 < S2S3/S3S4 < 1.4$.

49. (new) The projection objective of claim 42, wherein all physical mirror surfaces are aspherical.

50. (new) The projection objective of claim 42, wherein at most five physical mirror surfaces are aspherical.

51. (new) The projection objective of claim 42, wherein the second mirror, the third mirror, the fourth mirror, the fifth mirror, and the sixth mirror are in a concave-convex-concave-convex-concave sequence.

52. (new) A projection objective with an object plane and an image plane and a light path for a bundle of light rays from the object plane to the image plane, the projection objective comprising:

at least six mirrors, a first mirror (S1), a second mirror (S2), a third mirror (S3), a fourth mirror (S4), a fifth mirror (S5) and a sixth mirror (S6) in the light path from the object plane to the image plane, wherein each of the at least six mirrors has a physical mirror surface and wherein the physical distance between a vertex of the third mirror and a vertex of the sixth mirror (S3S6) is greater than 0.3 x (a used diameter of the third mirror S3 + a used diameter of the sixth mirror S6) .

53. (new) The projection objective of claim 52, wherein the physical mirror surfaces have a rotational symmetry with respect to a principal axis (PA).

54. (new) The projection objective of claim 52, further comprising an aperture stop (B) in the light path positioned between the second mirror (S2) and the third mirror (S3).

55. (new) The projection objective of claim 54, wherein a ratio of a physical distance between a vertex of the physical mirror surface of the first mirror and the vertex of the physical mirror surface of the third mirror (S1S3) to a physical distance between the vertex of the physical mirror surface of the first mirror and a vertex of the physical mirror surface of the second mirror (S1S2) is within the range of:

$0.5 < S1S3/S1S2 < 2.$

56. (new) The projection objective of claim 52, further comprising an aperture stop (B) positioned on or near the second mirror (S2).

57. (new) The projection objective according to claim 56, wherein a ratio of a physical distance between the vertex of the physical mirror surface of the second mirror and the vertex of the physical mirror surface of the third mirror (S2S3) to a physical distance between the vertex of the physical mirror surface of the third mirror and a vertex of the physical mirror surface of the fourth mirror (S3S4) is within the range:

$0.7 < S2S3/S3S4 < 1.4$.

58. (new) The projection objective of claim 52, wherein all physical mirror surfaces are aspherical.

59. (new) The projection objective of claim 52, wherein at most five physical mirror surfaces are aspherical.

60. (new) The projection objective of claim 52, wherein the second mirror, the third mirror, the fourth mirror, the fifth mirror, and the sixth mirror are in a concave-convex-concave-convex-concave sequence.

61. (new) A projection objective with an object plane and an image plane and a light path for a bundle of light rays from the object plane to the image plane, the projection objective comprising:

at least six mirrors, a first mirror (S1), a second mirror (S2), a third mirror (S3), a forth mirror (S4), a fifth mirror (S5) and a sixth mirror (S6) in the light path from the object plane to the image plane, wherein a physical distance between a vertex of the fifth mirror (S5) and the image plane is chosen such that at least the fifth mirror (S5) has a sufficient thickness and stability to prevent surface deformations due to high layer tensions.

62. (new) The projection exposure objective of claim 61, wherein the physical distance between the vertex of the fifth mirror and the image plane satisfies at least one of the following conditions:

the physical distance between the vertex of the fifth mirror and the image plane is greater than or equal to the used diameter of the physical mirror surface of the fifth mirror; or

the physical distance between the vertex of the fifth mirror and the image plane is greater than or equal to a sum of one-third of the used diameter of the physical mirror surface of the fifth mirror and a length between 20 mm and 30 mm, and wherein the physical mirror surface for a given mirror is the area where the bundle of light rays propagating from the object side to the image side impinges on the given mirror.

63. (new) The projection objective of claim 62, wherein the physical mirror surfaces have a rotational symmetry with respect to a principal axis (PA).

64. (new) The projection objective of claim 62, further comprising an aperture stop (B) in the light path positioned between the second mirror (S2) and the third mirror (S3).

65. (new) The projection objective of claim 64, wherein a ratio of a physical distance between a vertex of the physical mirror surface of the first mirror and a vertex of the physical mirror surface of the third mirror (S1S3) to a physical distance between the vertex of the physical mirror surface of the first mirror and a vertex of the physical mirror surface of the second mirror (S1S2) is within the range of:

$0.5 < S1S3/S1S2 < 2.$

66. (new) The projection objective of claim 62, further comprising an aperture stop (B) positioned on or near the second mirror (S2).

67. (new) The projection objective according to claim 66, wherein a ratio of a physical distance between the vertex of the physical mirror surface of the second mirror and the vertex of the physical mirror surface of the third mirror (S2S3) to a physical distance between the vertex of the physical mirror surface of the third mirror and a vertex of the physical mirror surface of the fourth mirror (S3S4) is within the range:

$0.7 < S2S3/S3S4 < 1.4$.

68. (new) The projection objective of claim 62, wherein all physical mirror surfaces are aspherical.

69. (new) The projection objective of claim 62, wherein at most five physical mirror surfaces are aspherical.

70. (new) A projection objective of claim 62, wherein the second mirror, the third mirror, the fourth mirror, the fifth mirror, and the sixth mirror are in a concave-convex-concave-convex-concave sequence.

71. (new) A microlithography projection exposure apparatus comprising:

a projection objective according to one of the claims 37, 42, 52 or 61; and

an illumination system comprising a radiation source providing a bundle of light rays illuminating an arc-shaped field in an object plane of the projection objective, wherein the projection objective images a mask located in the object plane into an image plane of the projection objective, where a light sensitive objective is situated.

72. (new) A process for producing a microelectronic device with a microlithography exposure apparatus according to claim 71, wherein the mask in the object plane is illuminated and said mask is imaged onto the light sensitive object situated in the image plane.